



Federal Aviation
Administration

**SPECIFICATION FOR ROOF REPLACEMENT
(Thermoplastic Polyolefin, TPO)
ATLANTA AIR ROUTE TRAFFIC
CONTROL CENTER
HAMPTON, GEORGIA**

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Prepared by: Enroute/ Flight Service Station Engineering Center Eastern Service Area

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SECTION 01 11 00 - SUMMARY OF WORK

01 11 13: Work Covered by Contract Documents- These specifications, together with the referenced specifications, standards, and drawings specified in the Contract Documents, cover the requirements for all work associated with the Roof Replacement Project for Atlanta Air Route Traffic Control Center (ARTCC). All work must be coordinated in order to allow continued operations in the facility. The total contract duration for completion of all work shall be 90 calendar days. **Prospective bidders are strongly recommended to perform a site visit to assess the actual conditions before submitting a bid. Site visits can be arranged by contacting David McClain at 770-210-7237 or david.mcclain@faa.gov**

01 11 13.10: Scope of Work

The sections of the control wing roof identified as B1, C and D on the roof plan drawing will be considered for replacement. Each section will be considered independently and included or excluded depending on total cost and funds available. The priority of the work on the roof sections will be in order B1, D and C.

Section B1:

Remove existing roofing down to the original roof deck. This will include a layer of plywood over perlite insulation plus another layer of insulation and the roofing system. Remove the unused supports and conduits penetrating the roof system back to the deck and close the unused penetrations in the deck. Remove and flashing and metal caps at on the walls surrounding the section. Remove existing electrical service to the roof section. Remove existing lightning protection. Remove and store Railings for adjoining roof section A. Remove blocked of drain back to the connection to the main drain and cap connection point. Install two new drains. Inspect and repair or replace decking. In areas that the deck is replaced or repairs cause the fireproofing to come off underneath the fire proofing will be replaced. Install an area divider to act as a water/moisture barrier between sections B1 and B2. Install new wood blocking and cants around perimeter and penetrations. Install new rigid insulation in multiple layers with a minimum LTTR of 30. Install a new Thermoplastic Polyolefin membrane roofing system to include flashing. Replace parapet copings. Install electrical service, lights and lighting protection for the area defined as B1 and C

Section D:

Remove existing roofing down to the original roof deck. This will include a layer of plywood over perlite insulation plus another layer of insulation and the roofing system. Remove and flashing and metal caps at on the walls surrounding the section. Remove existing electrical service to the roof section. Remove existing lightning protection. Install new wood blocking and cants around perimeter and penetrations. Install new rigid insulation in multiple layers with a minimum LTTR of 30. Install a new Thermoplastic Polyolefin membrane roofing system to include flashing. Replace parapet copings. Install electrical service, lights and lighting protection

Section C:

Remove existing roofing down to the original roof deck. This will likely include two existing roof systems. . Remove and flashing and metal caps at on the walls surrounding the section. Remove existing electrical service to the roof section. Remove existing lightning protection. Restore the expansion joint between the B and C-sections of the control wing roof. Install new wood blocking and cants around perimeter and penetrations. . Install new rigid insulation in multiple layers with a minimum LTTR of 30. Install a new Thermoplastic Polyolefin membrane roofing system to include flashing. Replace parapet copings.

01 11 13.20: Intent of specifications

This specification identifies all labor and equipment to perform the work required to construct the facility. All work performed and the Contracting Officer (CO) shall approve all materials and equipment used. This shall include but not be limited to inspection, scheduling, reporting and submittals.

01 11 13.30: Titles

Titles to division and sections of the specifications and notes and titles on drawings referring to subcontractors, division of work by trade, or type of work, are introduced merely for convenience in reading the specifications and drawings and do not imply any separate contractual arrangements of work assignments. Such separations into titled divisions and sections shall not operate to make the Government an arbiter to establish subcontract limits between the contractor and subcontractors, or between the subcontractors themselves

01 11 13.40: Contract documents

The construction of this facility shall be in accordance with the lines and grades shown on the drawings. The contractor shall not use dimensions scaled from drawings. The contractor shall verify all dimensions shown on the drawings by actual measurements in the field. Any discrepancies between the drawings and specifications and the existing conditions shall be referred to the CO for adjustment before any work affected is performed

01 11 13.50: Precedence of contract documents

In the event of a difference between the following contract provisions, the order of precedence to determine which provision shall govern is:

Contract Clauses and Provisions

Project Specifications

Project Drawings as listed in Part III - Section J

01 11 13.51: Discrepancies

Any discrepancies between the contract provisions, the specifications and the contract drawings shall be referred to the CO for a written determination in accordance with Contract Clause entitled Order of Precedence Refer to Part II, Section I.

01 11 13.60 Contracting Officer

The term "Contracting Officer" (CO) as used herein denotes the person designated to act on behalf of the Government in the performance of this contract. Where reference is made to "Federal Aviation Administration" (FAA), "Resident Engineer" (RE), "Contracting Officer's Representative" (COR), or the like, this shall mean the Contracting Officer or his/her authorized representative.

01 11 13.70 Contractor Superintendence

In accordance with Contract Clause entitled SUPERINTENDENCE BY THE CONTRACTOR, the Contractor shall at all times during performance of this contract and until the work is completed and accepted, directly superintend the work or assign and have on site a competent superintendent with the authority to act for the Contractor.

END OF SECTION 01 11 00

SECTION 01 14 00: Work Restrictions**01 14 11: Existing facility operations**

The ARTCC is a 24-hour, 7 day per week operating facility. The Contractor shall perform all work in a manner that does not conflict with or adversely affect the air traffic operational environment or functions of the ARTCC. In the event of any actual or potential conflict, air traffic control activities shall have priority over all Contractor activities. The Contractor shall plan for and provide services in such a manner and at such times that will not disrupt facility operations, and shall conform to those procedures considered essential by the FAA for ensuring air traffic safety. If the contractor is not adequately safeguarding air traffic equipment during demolition and construction they will be stopped until safe guards are in place.

01 14 13: Access to site**01 14 13.10**

The contractor shall confine operations, activities, storage of materials and employee parking within the designated area, as indicated on the drawings or as designated by Contracting Officer Representative (COR). If the contractor needs additional space for storage it shall be obtained off site, at no additional cost to the Government.

01 14 13.20

Access for the contractor, sub-contractors, employees, deliveries, etc., will be in approximate locations as indicated on the construction staging plan.

01 14 13.30

Access to the construction site shall be kept unobstructed. If temporary access obstruction is unavoidable, the contractor shall advise the Contracting Officer Representative (COR) immediately. The COR shall coordinate with the Facility prior to any temporary obstruction.

01 14 13.40

Temporary roadways and/or other access may be authorized only by the facility, by the COR.

01 14 13.50

Vehicles transporting materials shall not be loaded beyond the capacity prescribed by Federal, State or Local law.

01 14 13.60

Obstruction of existing roadways, driveways, etc., to the ARTCC is strictly prohibited. Access to the loading dock and ramp shall be maintained.

01 14 13.70

Damage caused by the contractor's activities to existing paving, lawns, curbs, sidewalks, interior/exterior of the building shall be repaired. The contractor shall pay all costs of repairs. After notice to proceed and prior to the commencement of construction, the contractor and RE shall conduct joint inspections of the existing areas affected by the construction. Existing damage/defects shall be noted and will be used as the basis for determination of damages caused by the contractor's operations.

01 14 16.10 Work hours

A regular work schedule shall be coordinated and agreed to with the Contractor, CO, COR and Facility Managers prior to the Notice to Proceed date. Considerations for work times include work activities that will impact the operations of the facility to include but not limited to noisy work and fumes or odors. If these conditions do not allow normal conversation or work to be carried out in the operational areas then the contractor will be required to do the work at times that mitigate the impact on current facility operations.

01 14 16.20 Shutdowns and cutovers

HVAC, power shutdowns or cutovers of environmental, utility and electrical systems impacting the operations shall be coordinated with the COR. All preparatory work shall be completed prior to shutdown/cutover to minimize downtime. Shutdown and cutovers shall be scheduled and coordinated with the COR a minimum of 10 working days in advance of the shutdown/cutover.

01 14 16.30 Notification of planned out of schedule work.

In the event the contractor intends to work overtime, weekends, holidays or otherwise out of their coordinated schedule, he shall notify the COR, who will coordinate with the CO and the Facility for approval. The request shall be at least 24 hours in advance of his commencement of the overtime work and 48 hours prior to night, weekend or holiday work

01 14 19: Use of Site**01 14 19.10 Contractor use of site**

Contractor shall assume full responsibility for the protection and safekeeping of products stored on the site.

01 14 19.11

The contractor and his subcontractors shall maintain the job site in a neat and orderly condition.

01 14 19.12

Concessionaires shall not be allowed on the grounds of the facility.

01 14 19.20 Government use of site**01 14 19.21**

The Government reserves the right to enter the premises during the term of the contract for periodic work inspections and for maintenance of existing equipment. The Contractor shall allow the Contracting Officer (CO) and COR complete access to all portions of the work.

01 14 19.22

See Part II, Section I, Contract Clause entitled OTHER CONTRACTS, for work by other contractors.

END OF SECTION 01 14 00

01 30 00 Administrative requirements**01 32 00 Construction Progress Documentation****01 32 16 Construction Progress Schedule**

The progress chart to be prepared and submitted by the Contractor pursuant to the Contract Clause entitled "**SCHEDULES FOR CONSTRUCTION CONTRACTS**" shall consist of network analysis system, or Gant chart (bar chart). The contractor shall be required to complete the work under the contract within 60 calendar days after receipt of Notice to Proceed.

01 32 16.13 Network Analysis Schedule:

The diagram shall show a continuous activity flow from left to right. The diagram shall show the sequence in which the work is to be accomplished as planned by the Contractor. Dates shall be shown on the diagram for start of the project, any milestones required by the contract, and contract completion.

- The critical path shall be clearly identified.
- Network activities shown shall include submittal and review of shop drawings and samples and procurement of materials and construction activities.
- Government activities that affect progress shall be shown. These include but are not limited to: Notice-to-Proceed, approvals, and inspections.

01 32 16.14 Digital Version of Schedule:

Digital versions of the schedule may be submitted if the schedule is provided in a program compatible with the existing computers used by the COR. An alternative will be if the contractor provides a licensed copy of scheduling software and the schedule for use until the contractor has received final payment. Use of the soft copy of the schedule shall depend on COR approval.

01 32 16.15 Two-week "Look ahead" schedule:

This schedule may be of the contractor's choosing, either bar chart or CPM format. Only activities scheduled to be occurring during the forecasted two-week time periods are to be shown. Schedules shall be submitted weekly. Early and Late Start and Finish dates, and subcontractors involved are data to be included in the schedule

01 32 17

NO PHYSICAL CONSTRUCTION WORK AT THE SITE MAY TAKE PLACE UNTIL THE CONTRACTOR SUBMITS AND THE GOVERNMENT APPROVES THE SCHEDULE. Government review of schedule submittal(s) will not exceed 5 calendar days. Re-submittal, if necessary shall not exceed 3 calendar days.

01 32 19 Submittal Schedule: Provide a schedule of submittals for shop drawings, material approval, etc., within 15 calendar days after contract award. Coordinate Submittal Schedule with the list of subcontracts, Schedule of Values, and the list of products as well as the Contractor's Construction Schedule.

End of Section 01 32 00

01 33 00 Submittal Procedures**01 33 01 General:**

Applicable provisions of this Section and other provisions and requirements of the Contract Documents apply to all sections, except as modified in Sections of Divisions 2 through 26.

01 33 03 Summary:

Submit Shop Drawings, product data, samples, warranties, certificates, test reports, operations/maintenance instructions, and parts lists as required by the contract documents.

01 33 05 Related Requirements:

- Section 01 40 00: Coordination, Contractor Quality Control, Permits and Testing
- Section 01 60 00: Materials and Equipment
- Section 01 71 29: Cutting and Patching
- Section 01 76 00: Final Inspection and Acceptance

01 33 07 Submission Requirements:**01 33 07.10 Number of Copies:**

Submit in ample time for approval before installation. Unless otherwise noted, submit three copies of documents to the Contracting Officer Representative (COR). One copy will be returned to the Contractor. If additional copies are required, provide the quantity and submit additional copies to meet this requirement.

01 33 07.20 Time for Approval:

Receive submittal approvals prior to starting the work. Time necessary for government approval or disapproval of samples, certificates, test reports, and shop drawings will not be more than 30 calendar days after receipt of a submittal. All materials installed in the work shall match the approved submittals. To avoid the need to delay installation as a result of the time required to process submittals, allow sufficient time for submittal review, including time for re-submittals. After a submittal has been approved, no substitutions will be permitted without written approval by the COR. No extension of Contract Time will be authorized because of failure to transmit to the COR sufficiently in advance of the Work to permit processing. The COR can withhold action on a submittal requiring coordination with other submittals until all related submittals are received.

01 33 07.30 Submittal Approval:

The checking, marking or approval of the submittal by the FAA shall not be construed as a complete check, but will indicate only that the product or method of construction and detailing is satisfactory. Approval will not relieve the contractor of the responsibility for compliance with the specifications or for any error, which may exist as the Contractor under the Contractor's Quality Control (CQC) requirements of this contract, is responsible for the dimensions and design of adequate connections, details, and satisfactory construction of all work. After the government has approved submittals, no re-submittal for the purpose of substituting materials or equipment will be given consideration unless accompanied by an explanation as to why a substitution is necessary. The Contractor shall be responsible for the dimensions and design of adequate connections, details, and satisfactory construction of all work. Possible approval actions taken by the FAA include:

Approved as submitted: If the COR marks "approved as submitted", each copy of the submittal will be identified as having received such approval by having an attached submittal form. After submittal has been approved, the COR will permit no substitutions without written approval.

Approved as noted: If the COR marks "approved as noted" on the submittal form, the submittal is satisfactory contingent upon Contractor acceptance of corrections, notations, or both, and if accepted, does not require re-submittal.

01 33 07.30 Submittal Approvals: Continued

Not approved: If the COR marks "not approved" on the submittal form, the submittal data does not meet job requirements and the Contractor must resubmit. If the submittal is disapproved, the Contractor shall resubmit the corrected material in the same quantity as specified for the original submittal. Correct disapproved submittals and resubmit for approval by the COR. Approval of re-submittals requires an additional 30 calendar days.

01 33 07.40 Contents:

On the schedule indicate the following information:

- Schedule date for the first submittal
- Related Section number.
- Submittal category (Shop Drawings, Product Data, or Samples)
- Name of the subcontractor
- Description of the part of the Work covered.
- Scheduled date for re-submittal
- Scheduled date for the COR 's final release or approval.

01 33 07.41 Distribution:

Following response to the initial submittal, print and distribute copies to the COR, Government, subcontractors, and other parties required to comply with submittal dates indicated. When revisions are made, distribute to the same parties. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.

01 33 07.43 Schedule Updates:

Revise the schedule after each meeting or activity where revisions have been recognized or made. Issue the updated schedule concurrently with the report of each meeting.

01 33 07.50 Critical Submittals:

Submit shop drawings, material and equipment lists, and all other data required under various headings of these specifications necessary to permit early commencement of work. Indicate on the submittal that it is critical to the early commencement of the work. Make these early submittals in advance of the schedule of submittals. COR will return the critical submittals within 20 calendar days after receipt, indicating approval or disapproval.

- Construction Schedule
- Roof system Manufacturers inspection schedule
- Construction schedule: with schedule of values
- Roofing materials, insulation, Thermoplastic Polyolefin membrane, adhesives
- Roofing system installation instructions
- Shop drawings for roofing details: Flashing at parapets, roof penetrations, roof drains
- Lightning protection

01 33 07.60 Submittal Preparation:

Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.

01 33 07.61 Transmittals:

Transmittal letters identifying the contents of the submittal shall accompany all submittals. It shall be clearly indicated on the transmittal letter with a statement and signature of the Contractor that the submittal item was verified for compliance with the contract requirements and approved by the Contractor. Transmittal letters shall consist of one original and one copy.

01 33 07.63 Contents:

Submittals shall be complete and detailed and assembled into sets. Lack of completeness or clarity or inadequate description will be justification for disapproval. Submittals shall bear the following information:

- Name of project or facility and contract number;
- Date of submission;
- Contract drawing number and detail references that submittal applies to;
- Specification section, page and paragraph number revision that submittal applies to;
- Name and address of the contractor;
- Name and address of the subcontractor;
- Name and address of the supplier;
- Name of the manufacturer;
- Clearly identified contents and location of work;
- Any proposed variances to specification requirements;
- Contractor's approval certifying he checked and coordinated the work of other trades.

01 33 13 Certificates:

Indicated in the sections of this specification. Assemble certificates executed by each of the respective manufacturers, suppliers, and subcontractors.

01 33 13.10 Additional Data:

Provide complete information for each item to certify compliance with contract documents.

- Product or work item
- Firm, with name of principal
- Scope of compliance
- Signature by an officer of the manufacturer or other individual authorized to sign documents on behalf of the company.

01 33 19 Test Reports:

Requirements for submittal of inspection and test reports from independent testing agencies are specified in individual sections of these Specifications and each written report shall include the following:

- Date issued
- Project title and number
- Testing laboratory name, address, and telephone number
- Name and signature of laboratory inspector
- Date and time of sampling or inspection
- Record of temperature and weather conditions
- Date of test
- Identification of product and specifications
- Location of sample or test in the project
- Type of inspection or test
- Results of tests and compliance with Contract Documents
- Interpretation of test results, when requested by Contracting Officer Representative

01 33 23 Shop Drawings Product Data

01 33 23.10 Shop drawings:

Present shop drawings in a clear and thorough manner. Identify details by reference to sheet and detail, schedule, or room numbers shown on contract drawings. Submit newly prepared information drawn accurately to scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not a Shop Drawing. Shop Drawings include fabrication and installation Drawings, setting diagrams, schedules, patterns, templates and similar Drawings.

01 33 23.11 Contents:

Provide the following information on each submittal:

- Submittal number and identify by specification section number.
- Reference to drawing number (with revision, if applicable) and/or specification section
- Clearly identify of contents and location of work
- Contractor's approval certifying he checked and coordinated the work of other trades
- Dimensions.
- Identification of products and materials included by sheet and detail number.
- Compliance with specified standards.
- Notation of coordination requirements.
- Notation of dimensions established by field measurement.
- Sheet Size: Except for templates, patterns and similar full-size Drawings, submit Shop
- Drawings on sheets at least 8-1/2 by 11 inches but no larger than 36 by 48 inches.

01 33 23.13 Initial Submittal:

Three blue- or black-line prints for COR review. The COR will return one copy

01 33 23.15 Final Submittal:

If final submittal is required, submit three blue- or black-line prints.

One of the prints returned shall be marked up and maintained as a "Record Document."

Do not use Shop Drawings without an appropriate final stamp indicating action taken.

01 33 23.20 Product Data

Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information, such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams, and performance curves.

01 33 23.21 Preparation:

Clearly mark or highlight each copy to identify pertinent products or models and/or options the Contractor intends to use. Where product data contains more than one product, clearly identify where each product is to be used, including cross-reference to locations in Contract Documents.

- Highlight all performance characteristics and capacities
- Highlight all dimensions and clearances required. Include the following information:
- Manufacturer's printed recommendations.
- Compliance with trade association standards
- Compliance with recognized testing agency standards.
- Application of testing agency labels and seals
- Notation of dimensions verified by field measurement.
- Notation of coordination requirements
- Show wiring or piping diagrams and controls.
- Provide material safety data sheets for hazardous, volatile and flammable materials

01 33 23.23 Manufacturer's Standard Schematic Drawings and Diagrams:

Modify drawings and diagrams to delete information that is not applicable to the work

Supplement standard information to provide information specifically applicable to the work

01 33 23.25 Samples:

Submit Samples of sufficient size and quantity to clearly illustrate the fully fabricated items cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture, and pattern.

Display: Mount or display Samples in the manner to facilitate review of qualities indicated. Prepare Samples to match the COR 's sample. Include the following:

- Specification Section number and reference.
- Generic description of the Sample.
- Sample source.
- Product name or name of the manufacturer.
- Compliance with recognized standards.
- Availability and delivery time.

Characteristics: Submit Samples for review of size, kind, color, pattern, and texture. Submit Samples for a final check of these characteristics with other elements and a comparison of these characteristics between the final submittal and the actual component as delivered and installed.

Where variation in color, pattern, texture, or other characteristic is inherent in the material or product represented, submit at least 3 multiple units that show approximate limits of the variations.

Refer to other Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, and details of assembly, connections, operation, and similar construction characteristics. Refer to other Sections for Samples to be returned to the Contractor for incorporation in the Work. Such Samples must be undamaged at time of use. On the transmittal, indicate special requests regarding disposition of Sample submittals.

Samples not incorporated into the Work, or otherwise designated as the Government's property, are the property of the Contractor and shall be removed from the site after acceptance of that work, and prior to Substantial Completion.

Preliminary Submittals: Submit a full set of choices where Samples are submitted for selection of color, pattern, texture, or similar characteristics from a range of standard choices.

The COR will review and return preliminary submittals with the COR 's notation, indicating selection and other action.

Final Submittals: Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation, and similar characteristics, submit 3 sets. The COR will return one set marked with the action taken.

Records: Maintain sets of Samples, as returned, at the Project Site, for quality comparisons throughout the course of construction.

Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.

Sample sets may be used to obtain final acceptance of the construction associated with each set.

End of Section 01 33 00

01 35 00 Special Procedures**01 35 53 Security Procedures****01 35 53.10**

Contractor shall provide the CO prior to Notice-To-Proceed with a complete list of contractor and subcontractor personnel including social security number, date of birth, and city of residence. The list shall be kept current during project work. No Contractor employees, associates, or other representatives shall be permitted access to the ARTCC grounds until that person's name and information has been provided and the appropriate security investigation has been completed by an FAA security officer for approval of access to the site with specified restrictions, if any. The FAA security officer may refuse access to the site to any employee, associate or other representative at any time for any reason.

01 35 53.20

Contractor and subcontractor personnel may be subject to a security investigation by the FAA. The contractor shall promptly complete and return applicable security forms furnished with the contract document for each employee as required. Forms must be completed and returned to the CO prior to subject employees working in the facility.

01 35 53.30

Contractor's personnel shall report to the FAA Security Guard at the front security gate and submit proper identification to obtain an FAA badge which will be worn on an outside garment at all times while on the ARTCC premises. This badge shall be returned daily to the security guard when such personnel leave the ARTCC premises.

01 35 53.40

Work shall be arranged so that contractor's personnel can be escorted when required by the FAA, in certain areas, which are considered to be restricted. No Contractor employee, associate, or other representative shall have any visual, audible, or physical access to any area marked as a "closed area". Any persons gaining access to any "closed area" shall report the access to the CO who will coordinate with the FAA security office to de-brief the people involved. Contractor's personnel shall not violate any security regulations pertaining to the ARTCC facility. Violators may be removed from the premises with the right to re-enter revocable. Contractor's day-to-day work schedules in the restricted areas shall be so arranged to allow for minimum escort.

01 35 53.50

A Contractor representative shall meet deliveries at the gate to the ARTCC and verify their deliveries with the Facility Security Guards. If no contractor representative is available the Security Guards can refuse to accept the delivery.

01 35 53.60

Current procedures at FAA facilities include the "right to search". Access to the site constitutes consent to search. If in the judgment of the FAA Security Guard a cause to search a vehicle or the person of personnel exists, such search will be made.

End of section 01 35 00

End Of 01 30 00

01 40 00 Quality Requirements**01 41 13 Codes**

This project is designed in accordance with the 2000 International Building Code, the National Fire Protection Association (NFPA) codes, NEC and other codes found in other specification sections. The Contractor shall perform all work in compliance with the latest edition of these codes unless otherwise specified.

01 41 26 Permits

A building permit is not required.

End of Section 01 41 00

01 42 19 Reference Standards

American Society for Testing and Materials (ASTM)

Roofing Terminology: Refer to ASTM D1079 for definitions of terms related to roofing work not otherwise defined in this Section.

ASHRAE Standard 90.1-2004

Factory Mutual

National Fire Protection Association (NFPA):

NFPA 70 (2003) - "National Electrical Code"

NFPA 780 (2000)—Lightning Protection Code

Underwriters Label - (U.L.) Standards for Safety.

International Plumbing Code 2003

Architectural Sheet Metal Manual, Sheet Metal and Air Conditioning Contractors National Association, Inc (SMACNA)

C518: Test method for steady-state heat flux measurements and thermal transmission properties by means of the heat flow meter apparatus.

C728: Specification for perlite thermal insulation board.

D36: Test method for softening point of bitumen (ring-and-ball apparatus).

D1079: Definitions of terms relating to roofing, waterproofing, and bituminous materials.

E84: Test method for surface burning characteristics of building materials.

E96: Test methods for water vapor transmission of materials.

E108: Test methods for fire tests of roof coverings.

E119: Test methods for fire tests of building construction and materials.

A526: Specification for steel sheet, zinc-coated (galvanized) by the hot-dip process, commercial quality.

A527: Specification for steel sheet, zinc-coated (galvanized) by the hot-dip process, lock-forming quality

A755: Specification for steel sheet, metallic-coated by the hot-dip process and pre-painted by the coil-coating process for exterior exposed building products.

B32: Specifications for solder metal.

B749: Specification for lead alloy strip, sheet, and plate products.

D4397: Specifications for polyethylene sheeting for construction, industrial, and agricultural applications.

E 154: Methods of testing materials for use as vapor barriers under concrete slabs and as ground cover in crawl spaces.

End of Section 01 42 00

01 43 13 Manufacturers Qualifications

Manufacturer Qualifications: Obtain primary products, including each type of roofing sheet, membrane flashings, and vapor retarder (if any), from a single manufacturer. Provide secondary products as recommended by manufacturer of primary products for use with roofing system specified.

01 43 23 Installer Qualifications

Installer Qualifications: Engage an experienced Installer (Roofer) who is certified by Thermoplastic Olefin Roofing system manufacturer as qualified to install manufacturers roofing materials.

Installers Field Supervision: Require Installer to maintain a full-time supervisor/foreman on job site during times that Thermoplastic Olefin membrane roofing work is in progress and who is experienced in installation of roofing systems similar to type and scope required for this Project.

End of Section 01 43 00

01 45 16 Field Quality Control Procedures**01 45 16.13 Contractor Quality Control**

Contractor Quality Control is the means by which the Contractor ensures that the construction, to include that of subcontractors and suppliers, complies with the requirements of the contract. The controls shall be adequate to cover all construction operations, including both on-site and off-site fabrication. The controls shall include at least three phases of control for all definable features of work, as follows:

01 45 16.15 Preparatory Phase:

This phase shall be performed prior to beginning work on each definable feature of work and shall include:

- A review of each paragraph of applicable specifications
- A review of the contract plans.
- A check to assure that all materials and drawings have been submitted, and approved
- Review roofing requirements for inspections, testing, certifications, forecasted weather conditions, governing regulations, insurance requirements, and proposed installation procedures
- A physical examination of required materials, equipment, and sample work to assure that they are on hand, conform to the approved shop drawing or submitted data, and are properly stored.
- Discuss roofing system protection requirements for construction period extending beyond roofing installation. Discuss possible need for temporary roofing
- The Government shall be notified of any of the required action of the preparatory phase. The Contractor shall instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.

01 45 16.17 Initial Phase:

This phase shall be accomplished at the beginning of a definable feature of work. The following shall be accomplished:

- A check of preliminary work to ensure that it is in compliance with contract requirements and submittals.
- Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with sample panels is appropriate.
- Review application of new roof system or repair procedure.
- The Government shall be notified at least 48 hours in advance of beginning the initial phase.

01 45 16.19 Follow-up Phase:

Daily checks with the RE shall be performed to assure continuing compliance with contract requirements. The Contractor shall not build upon or conceal non-conforming work.

01 45 16.21 Additional Preparatory and Initial Phases:

Additional preparatory and initial phases may be conducted on the same definable features of work as determined by the Government if the quality of on-going work is unacceptable; or if work is resumed after a substantial period of inactivity, or if other problems develop.

01 45 16.23 Pre-application Roofing Conference:

Approximately 2 weeks before scheduled commencement of TPO membrane roofing installation and associated work, meet at Project site with Installer, installer of each component of associated work, installers of deck or substrate construction to receive roofing work, installers of rooftop units and other work in and around roofing that precedes or follows roofing work, including mechanical work, COR, roofing system manufacturers representative, and other representatives directly concerned with performance of the Work, including test agencies, and governing authorities. Review foreseeable methods and procedures related to roofing work, including but not necessarily limited to the following: Tour representative areas of roofing substrates (decks), inspect and discuss condition of substrate, roof drains, curbs, penetrations, and other preparatory work performed by other trades. Review structural loading limitations of steel deck and inspect deck for loss of flatness and for required mechanical fastening.

Review roofing system requirements (drawings, specifications, and other contract documents).

Review required submittals, both completed and yet to be completed.

Review and finalize construction schedule related to roofing work and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

Review required inspection, testing, certifying, and material usage accounting procedures.

Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including possibility of temporary roofing (if not a mandatory requirement).

01 45 23 Testing Procedure:

The Contractor shall perform tests required to verify that control measures are adequate to provide a product that conforms to contract requirements.

01 45 23.10 Documentation

The Contractor shall maintain records of tests performed and up to date record drawings, including and modifications. Copies of this documentation shall be incorporated in final operations and maintenance manuals.

End of Section 01 45 00

End of Section 01 40 00

SECTION 01 50 00 TEMPORARY FACILITIES**01 51 13 Temporary Electrical Power:**

Reasonable amounts of electrical power will be furnished at no cost. Contractor will have to supply breakers. Connections to the existing facility electrical system at any other point are prohibited. The contractor shall provide a fused disconnect switch at the point of connection. The contractor shall provide all supply lines for lights and power, extension outlets, and extension cords, trailers, receptacles, bulbs, fuses and other equipment required for safety and for proper execution of the work, and for inspection purposes. Welders shall not be connected to Facility power.

01 51 26 Temporary Lighting:

Provide temporary artificial lighting for all areas when natural light does not meet minimum requirements for construction areas. The requirement for uniform illumination is 20 foot-candles

01 51 33 Temporary Telephone:

If necessary, the Contractor may arrange with local telephone Service Company to provide their own direct line service for use of personnel and employees.

01 51 36 Temporary Water:

The existing building water system may be used for construction purposes at no cost to the contractor. Obtain location connections from the Resident Engineer. Extend system as necessary to comply with temporary water requirements. The contractor shall pay for extension from the point of connection, including equipment, operation and attendance

01 51 39 Utility and Maintenance Costs:

Consumption costs of the temporary power service and the Government will pay temporary water service furnished to the contractor. The contractor shall pay for extension from the point of connection, including equipment, operation and attendance. The contractor shall pay all costs in connection with the maintenance of all temporary facilities.

End of Section 01 51 00

01 52 19 Sanitary Facilities

Contractor shall supply portable toilet for his personnel to use while on the job site. No contractor personnel will be allowed into the facility during the length of the project.

End of Section 01 52 00

01 54 00 Construction Aids: Furnish, install and maintain required construction aids. Remove on completion of work. Provide construction aids and equipment required by personnel and to facilitate execution of the work i.e. trench boxes, scaffolds, staging, ladders, stairs, ramps, runways, platforms, railings, hoists, cranes, chutes and other such facilities and equipment.

End of Section 01 54 00

01 55 00 Vehicular Access and Parking:**01 55 19 Parking:**

Coordinate with the COR for parking Contractor personnel and Contractor vehicles.

01 55 29 Staging Areas:

Coordinate with the COR for staging areas

End of Section 01 55 00

01 56 00 Barriers:

Furnish, install and maintain suitable barriers as required to prevent public entry, and to protect the work, existing facilities, trees and plants from construction operations; remove when no longer needed, or at completion of work. Materials choices are the contractor's option, as appropriate to serve required purpose. Where any removal, drilling or cutting of walls or other surfaces in areas of existing facilities operations occurs, the contractor shall install temporary partitions prior to demolition to prevent entrance of dust or other matter into the working areas. Where normal activities are to be carried on inside the building adjacent to the partition, the partition shall be thermally insulated and acoustically treated to prevent entry of temperature extremes and construction noise.

End of Section 01 56 00

01 59 00 Removal of Temporary Facilities

The contractor shall promptly remove all temporary facilities from premises at end of work. If the contractor fails to do so within a reasonable time after notification, the FAA will have the items removed at the contractor's expense.

End of Section 01 59 00
END OF SECTION 01 50 0

SECTION 01 60 00 - MATERIALS AND EQUIPMENT**01 61 11 General Requirements**

Material and equipment incorporated into the work:

Conform to applicable specifications and standards.

Comply with size, make, type and quality specified, or as specifically approved in writing by the CO.

Manufactured and Fabricated Products: Design, fabricate and assemble in accordance with the best engineering and shop practices.

Do not use material or equipment for any purpose other than for which it is designed or is specified.

01 61 16 Manufacturer's Instructions:

When Contract Documents requires that installation of work shall comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to parties involved in the installation, including a copy to the COR. Handle, install, connect, clean, condition and adjust products in strict accordance with such instructions and in conformity with specified requirements. Perform work in accordance with manufacturer's instructions. Do not omit any preparatory step or installation procedure unless specifically modified or exempted by Contract Documents.

Should job conditions or specified requirements conflict with manufacturer's instructions, consult with the RE for further instructions.

Do not proceed with work without clear instructions.

01 61 19 Substitutions Requests:

If a material substitution is required the contractor will submit a written request to the COR. The request will outline the reason the substitution and a detailed description of the proposed substitution. These changes shall not alter the cost of the contract. Any substitutions resulting in a claim by the contractor will be handled as a contract modification. The overall format of the substitution shall conform to section 01 33 00 Submittal procedures.

End of Section 01 61 00

01 65 00 Product Deliveries:

Arrange deliveries of products in accordance with construction schedules, coordinate to avoid conflict with work and conditions at the site. Deliver products in undamaged condition, in manufacturer's original containers or packing, with identifying labels intact and legible. Immediately on delivery, inspect shipments to assure compliance with requirements of Contract Documents and approved submittals, and that products are properly protected and undamaged.

01 65 13 Handling at delivery

Provide equipment and personnel to handle products by methods to prevent soiling or damage to products or packing.

End of Section 01 65 00

01 66 00 Product Storage and Handling

Store products in accord with manufacturer's instructions, with seals and labels intact and legible.

Store products subject to damage by the elements in weather tight enclosures. Maintain temperature and humidity within the ranges required by manufacturer's instructions. Arrange storage in a manner to provide easy access for inspection. Provide equipment and personnel to maintain the integrity of material to be installed.

01 66 03 Roofing Storage and Handling

Store and handle roofing sheets in a dry, well-ventilated, weather tight place to ensure no possibility of significant moisture pickup. Store rolls of felt and other sheet materials on end on pallets or other raised surface. Do not leave unused felts and other sheet materials on the roof overnight or when roofing work is not in progress unless protected from weather or other moisture sources. Handle and store materials or equipment in a manner to avoid significant or permanent deflection of deck.

01 66 06 Lumber Delivery, Storage and Handling

Keep materials under cover and dry. Protect from weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels. Provide for air circulation within and around stacks and under temporary coverings. For lumber and plywood pressure treated with waterborne chemicals, place spacers between each bundle to provide air circulation

End of Section 01 66 00

End of Section 01 60 00

01 70 00 Execution and Closeout Requirements**01 71 33 Protection of Adjacent Construction and Facilities**

Insure that roofing activities do not cause damage to adjacent work. Insure that roofing activities do not blow debris or loose roof material in areas adjacent to roof work. If necessary the contractor may use closing of sidewalks or moving vehicles to provide protection. The Contractor shall coordinate with the COR no less than 72 hours prior to the proposed closures.

SECTION 01 73 29 Cutting and Patching**01 73 29.10 Requirements included:**

Contractor shall be responsible for all cutting, fitting and patching, required to complete the work or to: Remove and replace defective work.

Remove and replace work not conforming to requirements

Coordinating the date and time of cutting a patching with the COR.

01 73 29.20 Submittals:

Submit a written Request for Information (RFI) to the RE a minimum of 2 days in advance of executing any cutting or alteration which may affect:

The work of the Government or any separate contractor

The structural integrity of any element of the Project

The integrity of weather-exposed or moisture-resistant elements or systems

The efficiency, operational life, maintenance or safety of operational elements

The visual qualities of sight-exposed elements

01 73 29.21 Contents

Request shall include:

Identification of the Project

Description of affected work

The necessity for cutting, alteration, or excavation

Effect on work of Government or other work, or on structural or weatherproof integrity of the affected element

Description of proposed work:

Scope of cutting, patching, alteration, or excavation

Trades who will execute the work

Products proposed to be used.

Extent of refinishing to be done

Alternatives to cutting and patching

Cost proposal, when applicable

The written concurrence of any separate contractor whose work will be affected

01 73 29.30 Change in Materials

If the conditions of work or the schedule indicate a change of products from original installation, contractor shall submit request for substitution as specified in Section, 01 61 19.

01 73 29.40 Inspection:

Inspect existing conditions of project.

After uncovering work, inspect conditions affecting installation of products, or performance of work.

Report unsatisfactory or questionable conditions to the COR in writing; do not proceed with work until the COR has provided further instructions.

01 73 29.50 Preparation:

Provide adequate temporary support as necessary to assure structural value or integrity of affected portion of work.

Provide devices and methods to protect other portions of project from damage.

Provide protection from elements for that portion of the project, which may be exposed by cutting and patching work.

01 73 29.60 Performance:

Execute cutting and demolition by methods, which will prevent damage to other work, and will provide proper surfaces to receive installation of repairs.

Execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerance and finishes.

End of Section 01 73 00

SECTION 01 74 00 - CLEANING**01 74 13 Progress Cleaning:**

Execute daily cleaning to keep the work, the site and adjacent properties free from accumulations of waste materials, rubbish and windblown debris, resulting from construction operations. Provide on-site containers for the collection of waste materials, debris and rubbish. Remove waste materials, debris and rubbish from the site periodically and dispose of at legal areas away from the site.

01 74 16 Site Maintenance:

Maintain all areas under contractor's control free of extraneous debris on a daily basis as a minimum. Initiate and maintain a specific program to prevent accumulation of debris at construction site, storage and parking areas, or along access roads and haul routes. Schedule periodic collections and disposal of debris.

Provide containers for deposit of debris.

Prohibit overloading of trucks to prevent spillage on access and haul routes.

Provide additional collection and disposal of debris whenever the periodic schedule is inadequate to prevent accumulation.

01 74 23 Final Cleaning:

Prior to final completion, contractor shall conduct an inspection of sight-exposed exterior surfaces, and all work areas to verify that the entire work is clean

End of Section 01 74 00

SECTION 01 76 00 - PROTECTION OF INSTALLED CONSTRUCTION**01 76 13 Requirements Included:**

It shall be the contractor's responsibility to provide protection of work from weather, physical damage, improper use, and other adverse natural conditions. The contractor shall be responsible to replace any damaged work including material.

01 76 16 Protection During Installation:

Proceed with roofing work only when existing and forecasted weather conditions will permit unit of Work to be installed in accordance with manufacturers' recommendations and warranty requirements.

Temporary Roofing: When adverse job or weather conditions prevent permanent roofing system from being installed according to requirements and Contractor determines that roofing cannot be delayed because of need for job progress or protection of other work, install temporary roofing.

Provide protection of temporary openings in the building to protect the contents and enable work to progress.

End of Section 01 76 00

SECTION 01 77 00 – CLOSEOUT PROCEDURES**01 77 13 Contractors Acceptance Inspection (CAI):**

When the Contractor can submit written certification that contract documents have been reviewed and that the manufacturers certificate of warranty has been issued, then the Contractor will notify the COR and arrange for an acceptance inspection of their work. The inspection will assure that the work in the contract is complete, in compliance with the contract that all new installed equipment is tested and functioning as specified and the premises are cleaned and ready for government use. Upon completion of the inspection the COR will provide a list of deficiencies (Punch list) for the Contractor to correct. The COR will provide the list no later than 2 business days after completion of the inspection.

01 77 16 Joint Acceptance Inspection (JAI):

The COR will coordinate with the CO and facility personnel to schedule the final inspection upon approval and endorsement of the Contractor's Completion Certification. Any deficiencies relating to the contractors work will be noted and passed on to the contractor in writing for correction.

01 77 19 Close out Requirements:

The contractor shall provide all close out submittals called for in section 01 78 00 Closeout Submittals. The contractor shall review the deficiencies list from the CAI and JAI and verify that all of the contractors deficiencies have been corrected with the COR. The COR will notify the CO when

End of Section 01 77 00

SECTION 01 78 00 Closeout Submittals**01 78 13 Completion of Inspection Punch List:**

The contractor shall submit the punch list with the date that all the deficiencies were corrected and endorsed by the contractor.

01 78 16 As built drawings:

The contractor shall provide drawings of the work as it was actually constructed. Initial submittals can be hand-marked copies of the project drawings. The final drawings shall be black line drawings or Computer Aided Design files in Micro Station Version 8. The drawings shall indicate the actual replaced roof areas the locations drains, expansion joints, area dividers, etc. Also show as built electrical work indicating lights, lightning protection, conduit runs, circuit identification and etc.

01 78 23 Operations and Maintenance Data:

This Section includes requirements for Operation and Maintenance (O&M) manuals for hard copy and electronic/record documents, including the following:

The roofing system
Lightning Protection
Electrical Lighting

.

01 78 23.03 Manual Preparation:

Maintenance Manual Preparation: In preparation of maintenance manuals, use competent/certified personnel thoroughly trained and experienced in operation and maintenance of equipment or systems involved.

Provide O & M manuals prepared in accordance with this Section.

Where specifications require written instructions, use personnel skilled in technical writing where necessary for communication of essential data.

Where specifications require drawings or diagrams, use personnel skilled in preparing drawings clearly in an understandable format

01 78 23.06 Submittal Schedule:

Submittal Schedule: Unless otherwise noted, comply with the following schedule for submitting operation and maintenance manuals:

- Draft O&M Documentation for Individual Items. Sixty days after approval of each technical submittal, submit 2 draft sets of O&M documentation for the approved item to the COR for review. All O&M submittals shall be manufacturer's original publications. Photocopies will not be accepted. Manuals shall be organized by specification section. The COR will return 1 copy of the draft with comments within 30 days of receipt
- The final O&M documentation. Make corrections or modifications to comply with the COR's comments. Submit two sets of the final O&M documentation to the COR within 15 days of receipt of the COR's comments

01 78 23.11 Format of Manuals:

The Form of the Submittal: Prepare operation and maintenance manuals in the form of an instructional manual for use by the Government's operating personnel.

Binders: For each manual, provide heavy-duty, commercial-quality, 3-ring, vinyl-covered, loose-leaf binders, maximum of 3 inches thick, sized to receive 8-1/2-by-11- inch paper. Provide a clear plastic sleeve on the spine and front cover to hold labels describing contents. Provide 3-hole punched, heavy-duty sheet protectors to hold folded oversized documents. Do not fill binders to more than 1/2 capacity. Where multiple binders are necessary to accommodate data, correlate data in each binder into related groupings according to the Project Manual table of contents. Cross-reference other binders where necessary to provide essential information for proper operation or maintenance of the piece of equipment or system. Identify each binder on front and spine, with the printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter covered. Indicate volume number for multiple volume sets of manuals

Dividers: Provide heavy paper dividers with clear celluloid-covered tabs for each separate Section. Mark each tab to indicate contents. Provide a description of the product and major parts of equipment included in the Section on each divider

Text Material: Provide the manufacturer's standard printed material. If manufacturer's standard printed material is not available, provide specially prepared data, computer generated, on 8-1/2-by-11 inch, 20-lb/sq. ft. white bond paper.

Drawings: Provide reinforced, punched binder tabs on drawings and bind with text. Where oversize drawings are necessary, fold drawings to the same size as text pages, and inserted in a 3-hole-punched, heavy-duty plastic sheet protector.

01 78 23.11 MANUAL CONTENT:

Include information required by the individual Specification Sections. Information shall be separated by specification section.

General Information:

Manufacturer's product information

Supplier information

Warranty information

Safety precautions

Maintenance & repair procedures

Replacement parts identification & installation

Normal operating instructions

Preventive maintenance plan/schedule

Alignment, adjusting and checking information

Removal and replacement instructions

Parts identification

Wiring diagrams In-depth Information:

01 78 23.13 Operation Data:

Equipment or System Function
 Operating characteristics
 Safety precautions
 Environmental and limiting conditions
 Engineering data and tests
 Routine operations
 Operating Procedures including:
 Start up and shut down procedures
 Routine and normal operating instructions
 Regulation and control procedures

01 78 23.16 Maintenance Data:

Manufacturer's Information including:
 Complete nomenclature and number of replacement parts
 Supplier and vendor information
 Assembly drawings and diagrams required for maintenance
 List of items recommended to be stocked as spare parts
 Wiring and control diagrams

01 78 23.19 Preventive Maintenance Instructions:

Printed operation and maintenance instructions
 Troubleshooting guide & diagnostic techniques
 Disassembly, repair and reassemble
 Alignment, adjusting and checking
 Testing equipment & special tool information
 Emergency procedures
 Required sequences for electric or electronic systems
 Special operating instructions
 Operator service requirements

01 78 23.21 Organization of the manual:

Title page: Provide a title page in a transparent, plastic envelope as the first sheet of each manual.
 Provide the following information:

Table of Contents: After the title page, include a computer-generated table of contents for each volume, arranged systematically according to the Project Manual format. Include a list of each product incorporated, identified by product name and other appropriate identifying symbol and indexed to the content of the volume. Where multiple volumes are required to accommodate data, provide a comprehensive table of contents for all volumes in each volume of the set.

General Information: Provide a general information Section immediately following table of contents, listing each product included in the manual, identified by product name. Under each product, list the name, address, and telephone number of the subcontractor or installer and the maintenance contractor where applicable. Clearly delineate the extent of responsibility of each of these entities. Include a local source for replacement parts and equipment.

01 78 23.21 Organization of the manual: continued

Product Data: Where the manuals include manufacturer's standard printed data, include only sheets that are pertinent to the part or product installed. Mark each sheet to identify each part or product included in the installation. Where the Project includes more than one item in a tabular format, identify each item, using appropriate references from the Contract Documents. Identify data that is applicable to the installation, and delete references to information that is not applicable.

01 78 23.21 Organization of the manual: continued

Written Text: Prepare written text to provide necessary information where manufacturer's standard printed data are not available, and the information is necessary for proper operation and maintenance of equipment or systems. Prepare written text where it is necessary to provide additional information or to supplement data included in the manual. Organize text in a consistent format under separate headings for different procedures. Where necessary, provide a logical sequence of instruction for each operation or maintenance procedure.

Drawings: Provide specially prepared drawings where necessary to supplement manufacturer's printed data to illustrate the relationship of component parts of equipment or systems or to provide control or flow diagrams. Coordinate these drawings with information contained in project record drawings to ensure correct illustration of the completed installation.

01 78 36 Warranties/Guaranties:

Assemble two originally signed and notarized copies of warranties executed by each of the respective manufacturers, suppliers, and subcontractors into a warranty book and prepare a Table of Contents. Organize the contents of the warranty book alphabetically by manufacturer's name. If warranty is by supplier or subcontractor, sort according to the name of the entity who provided the warranty with a cross-reference in the Table of Contents listed under the name of the manufacturer.

01 78 36.10 Additional Data:

Provide complete information for each item that includes the following:

Product or work team

Firm, with name of principal, address, and telephone

Scope

Effective dates of warranty

Information for Government personnel on proper procedures to activate the warranty in case of failure of the Work, and for instances where the Government must contact manufacturer when performing additional work, which might affect the validity of the warranty

01 78 36.20 Roof Warranties

Special Project Warranty: Submit two executed copies of standard 2-year Roofing Warranty on form approved by COR covering work of this section including roofing membrane, membrane flashing, roof insulation, flashing specified in Section 07620, "Flashing and Sheet Metal" roof expansion control specified in Section 07716, "Roof Expansion Assemblies" and roofing accessories specified in Section 07720, "Roof Accessories" signed and countersigned by Installer (Roofer) and Contractor.

Manufacturers Warranty: Submit executed copy of roofing manufacturers standard No-Dollar-Limit, Non-Pro-Rated Service Warranty agreement including flashing endorsement, signed by an authorized representative of TPO roof system manufacturer, on form that was published with product literature as of date of Contract Documents, for the following period of 20 years after date of Final Acceptance by the Government

Puncture Resistance Warranty: In addition to Special Warranty, Contractor agrees to repair and replace all or part of components of membrane roofing system with damage caused by accidental punctures. Provide a no dollar limit, 20-year warranty.

01 78 36.30 Electrical and other warranties:

All systems and components shall be provided with a one (1) year warranty from the time of final acceptance or beneficial occupancy. The warranty shall affect all materials and workmanship. During this warranty period all defects in materials and workmanship shall be corrected by repair or replacement without incurring additions to the Contract. All extended warranties shall stand for the period of time as stipulated in the warranty.

01 78 36.40 **Effective dates of warranties:** Warranties shall not be effective until the FAA accepts the work.

End of Section 01 78 00

End of Section 01 70 00

SECTION 01 80 00 Performance Requirements**01 83 19 Roofing System Performance Requirements:**

01 83 19.13 General: Install Thermoplastic Polyolefin membrane roofing to withstand wind loads, structural movement, thermally induced movement, and exposure to weather, without failure.

01 83 19.16 UL Listing:

Provide Thermoplastic Polyolefin membrane roofing system and component materials that have been tested for application and slopes indicated and are listed by Underwriters Laboratories, Inc. (UL) for Class A external fire exposure.

Provide roof-covering materials bearing UL Classification Marking on bundle, package, or container indicating that materials have been produced under UL's Classification and Follow-up Service.

Provide Thermoplastic Polyolefin membrane roofing system that can be installed to comply with UL requirements for Class A Fire Classified and Class 90 wind-uplift requirements.

01 83 19.19 FM Listing:

Provide Thermoplastic Polyolefin membrane roofing system and component materials that have been evaluated by Factory Mutual System for fire spread, wind uplift, and hail damage and that are listed in "Factory Mutual Approval Guide" for Class I construction.

Roofing system shall comply with FM Class I-90 for wind-uplift resistance.

Provide roof-covering materials bearing FM approval marking on bundle, package, or container, indicating that material has been subjected to FM's examination and follow-up inspection service.

01 83 19.22 Sheet Metal Flashing and Trim

General: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing. Fabricate and install flashings at roof edges to comply with recommendations of FM Loss Prevention Data Sheet 1-49 for the following wind zone:
Zone 1: Wind pressures of 30 psf.

01 83 19.25 Insulation Fire-Performance Characteristics:

Provide insulation materials that are identical to materials whose fire-performance characteristics have been determined for the assemblies of which the insulation materials are a part, per test method listed below, by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

Surface Burning Characteristics: ASTM E84.

Fire Resistance Ratings: ASTM E119

01 83 19.28 Insulation Thermal Performance Requirements

Provide insulation materials that will provide a minimum design LTTR of 30.

End of Section 01 80 00

SECTION 06 00-00 Woods Plastics and Composites**06 05 03 Wood Submittals:****06 05 03.10**

Wood treatment data as follows, including chemical treatment manufacturer's instructions for handling, storing, installing, and finishing treated materials:

For each type of preservative-treated wood product, include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.

For waterborne-treated products, include statement that moisture content of treated materials was reduced to levels indicated before shipment to Project site.

For fire-retardant-treated wood products, include certification by treating plant that treated materials comply with specified standard and other requirements as well as data relative to bending strength, stiffness, and fastener-holding capacities of treated materials.

06 05 03.20

The material test reports from a qualified independent testing agency indicating and interpreting test results relative to compliance of fire-retardant-treated wood products with performance requirements indicated.

06 05 03.30

Provide a warranty of chemical treatment manufacturer for each type of treatment.

06 05 09 Lumber General requirements:**06 05 09.10 Lumber Standards:**

Comply with DOC PS 20, "American Softwood Lumber Standard," and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee's (ALSC) Board of Review.

06 05 09.20 Inspection Agencies:

Inspection agencies, and the abbreviations used to reference them, include the following:

NELMA - Northeastern Lumber Manufacturers Association

SPIB - Southern Pine Inspection Bureau

WWPA - Western Wood Products Association.

06 05 09.30 Grade Stamps:

Provide lumber with each piece factory marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill. For exposed lumber, furnish pieces with grade stamps applied to ends or back of each piece.

06 05 09.40

Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.

Provide dressed lumber, S4S, unless otherwise indicated.

Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal thickness or less, unless otherwise indicated.

06 05 73.13 FIRE-RETARDANT-TREATED MATERIALS

The Contractor shall use fire-retardant-treated wood; comply with applicable requirements of AWP C20 (lumber) and AWP C27 (plywood) for all permanent and temporary interior wood structures. Identify fire-retardant-treated wood with appropriate classification marking of UL; U.S. Testing; Timber Products Inspection, Inc.; or another testing and inspecting agency acceptable to authorities having jurisdiction. Treatment Types: Interior Type A for protected wood and exterior for wood exposed to weather. Inspect each piece of treated lumber or plywood after drying and discard damaged or defective pieces.

06 05 73.33 Preservative Wood Treatment

Where lumber or plywood is indicated as preservative treated or is specified to be treated, comply with applicable requirements of AWP C2 (lumber) and AWP C9 (plywood). Mark each treated item with the Quality Mark Requirements of an inspection agency approved by ALSC's Board of Review.

- Do not use chemicals containing chromium or arsenic.
- For exposed items indicated to receive stained finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.
- Pressure treat above ground items with waterborne preservatives to a minimum retention of 0.25-lb/cu. ft. After treatment, kiln-dry lumber and plywood to a maximum moisture content of 19 and 15 percent, respectively. Treat indicated items and the following:
 - Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 - Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
- Pressure treat wood members in contact with ground with waterborne preservatives to a minimum retention of 0.40 lb/cu. ft.

End of Section 06 05 00

06 06 10.13 Nailing Schedule:

Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.

Where miscellaneous carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with a hot-dip zinc coating per ASTM A 153 or of Type 304 stainless steel.

- Nails, Wire, Brads, and Staples: FS FF-N-105.
- Power-Driven Fasteners: CABO NER-272.
- Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

06 06 10.15 Boards Schedule

Exposed Boards: Where boards will be exposed in the finished work, provide the following:

- Moisture Content: 19 percent maximum.
- Species and Grade: Southern pine, C Finish per SPIB rules.

06 06 10.16:

Where boards will be concealed by other work, provide lumber with 19 percent maximum moisture content and of following species and grade. Species and Grade: Eastern softwoods, No. 3 Common per NELMA rules.

06 06 10.17 Miscellaneous Lumber Schedule

- General: Provide lumber for support or attachment of other construction, including rooftop equipment curbs and support bases, cant strips, bucks, nailers, blocking, furring, grounds, stripping, and similar members.
- Fabricate miscellaneous lumber from dimension lumber of sizes indicated and into shapes shown.
- Moisture Content: 19 percent maximum for lumber items are not specified to receive wood preservative treatment.
- Grade: For dimension lumber sizes, provide No. 3 or Standard grade lumber per ALSC's NGRs of any species. For board-size lumber, provide No. 3 Common grade per NELMA or WWPA; No. 2 grade per SPIB; or Standard grade per WCLIB or WWPA of any species.

End of Section 06 06 00

06 10 53 Miscellaneous Rough carpentry:**06 10 53.10 Workmanship Standards**

- Discard units of material with defects that impair quality of carpentry and that are too small to use with minimum number of joints or optimum joint arrangement.
- Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted.
- Fit carpentry to other construction; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow attachment of other construction.
- Apply field treatment complying with AWWPA M4 to cut surfaces of preservative-treated lumber and plywood.
- Securely attach carpentry work as indicated and according to applicable codes and recognized standards.
- Countersink nail heads on exposed carpentry work and fill holes with wood filler.
- Use fasteners of appropriate type and length. Predrill members when necessary to avoid splitting wood.
- Nailer thickness shall be $\pm 1/4$ inch of adjacent construction. This variation shall not contribute to ponding.

06 10 53.20 Wood Grounds, Nailers, Blocking and Sleepers

- Install where shown and where required for screeding or attaching other work. Cut and shape to required size. Coordinate locations with other work involved.
- Attach to roof with suitable fastener with a minimum withdrawal resistance of 100-lbs.
- Use fasteners staggered 6-inches on center within 8 ft of an outside corner and 12 inches on center along other perimeter areas.

End of Section 06 10 00

07 06 00 Schedules For Thermal and Moisture Protection**07 06 50 Schedule for Membrane Roofing**

Fabric-Reinforced Thermoplastic Polyolefin Sheet: ASTM D 6878, internally fabric or scrim reinforced, uniform, flexible TPO sheet. Manufacturers: Subject to compliance with requirements, provide products by Stevens Roofing Systems; Division of JPS Elastomerics. Other available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

Carlisle SynTec Incorporated.

07 06 50.10 Membrane Roofing Physical Properties

- Thickness: 80 mils, nominal with a minimum of 34 mils above scrim.
- Exposed Face Color: White.
- Breaking strength: 390 lbf by ASTM D-751
- Tear strength: 104 lbf by ASTM D-751
- Puncture Resistance: 500 lbf by FTM 101B Method 2031
- Water Vapor Transmission 0.035 perms by ASTM E-96

End of Section 07 06 50

07 06 60 Schedules for Flashing Sheet metal**07 06 60.03: Membrane Flashing**

Flashing shall be compatible with the selected roof manufacturers Thermoplastic Olefin membrane roofing system. With a thickness of no less than 45 mil

07 06 60.06 Sheet Metal:

Coil-Coated Galvanized Steel Sheet at Rain Drainage: Zinc-coated, commercial-quality steel sheet conforming to ASTM A755, G90 coating designation, coil coated with high-performance fluoropolymer not less than 0.0336 inch thick, unless otherwise indicated. The COR will select the color and gloss from manufacturers full range of choices for color and gloss.

07 06 70 Schedules for Roof Specialties and accessories:**07 06 70.03 Fasteners:**

Provide galvanized steel mechanical fasteners for TPO membrane roofing system work at metal deck, tested by manufacturer for required pull-out strength where applicable and compatible with deck type and roofing products used. Provide manufacturer approved plate fasteners for insulation and membrane.

07 06 70.06 Substrate Joint Tape:

6-inch- or 8-inch-wide, coated, glass-fiber joint tape

07 06 70.09 Lead Sheet:

ASTM B749, Type L51121 copper bearing sheet lead, 6 lbs/sq-ft.

07 06 70.12 Mastic Sealant:

Use TPO roof system manufacturer's approved sealant

07 06 70.15 Cants:

Shall be wood see section 06 00 00

07 06 70.17 Drains:

Roof drains shall be sized and discharged in accordance with International Plumbing Code 2003. All drain components shall be cast iron including drain body, clamping ring and strainer. Acceptable Manufacturers:

- Donovan Manufacturing Co. North Reading, MA
- Josam Manufacturing Co., Michigan City, IN
- Smith Manufacturing Co, Inc., Montgomery, AL
- Tyler Pipe, Tyler, TX
- Zurn Industries, Inc., Erie, PA

End of section 07 06 00

07 20 00 Thermal Protection**07 22 16.10 Roof Board Insulation:**

Polyisocyanurate Board Insulation: Rigid boards of minimum 2.0-pcf-density polyisocyanurate-based foam core, bonded to roofing felt facer sheets and board. Provide in thickness indicated, with minimum k value of 0.17 when tested according to ASTM C518 after insulation is conditioned per RIC/TIMA 281-1 Conditioning Procedure. Provide in manufacturer's standard sizes. Install in multiple layers to achieve a minimum LTTR of 30 for the total thickness of insulation. Install in accordance with manufacturers instructions.

07 22 16.13 Substrate boards:

Use G-P DensDeck DuraGuard (Type X) 5/8 inches for the prime roof board between the deck and the first layer of insulation board. This is a glass mat faced gypsum panel with blue low-perm integrated coating on one side and coated glass mat on the back.

07 22 16.15 Protections Boards:

Use G-P DensDeck Roof Board (Type X) 1/2 inch on top of the polyisocyanurate board insulation. This is a glass mat faced gypsum board with non-asphaltic heat cured coating.

07 22 16.22 Crickets:

Asphalt coated fiberboard, factory fabricated 2' X4' dimension. The slope shall be twice (2 times) the roof system slope with a minimum of 1/2 inch per foot.

07 22 16.25 Installing insulation

In General comply with insulation manufacturers instructions and recommendations for the handling, installation, and bonding or anchorage of insulation to substrate.

- Install Substrate board over metal deck prior to installing insulation. Comply with UL Design requirements for installation of board and for treatment of joints.
- Secure first layer of insulation to deck using mechanical fasteners specifically designed and sized for attaching specified board-type insulation to deck type shown.
- Secure insulation over entire area of roofing, including at field and at perimeters at spacing as required by UL for Class 90 wind uplift criteria. Run long joints for insulation in continuous straight lines, perpendicular to the direction of the membrane seam with end joints staggered between rows.
- Two-Layer Installation: Install second layer of insulation with joints of second layer staggered from joints of first layer a minimum of 12 inches each direction. Install second layer using mechanical fasteners. Utilize tapered insulation at drains and crickets and at locations shown.

07 22 16.25 Installing insulation continued

- Trim surface of insulation where necessary at roof drains so completed surface is flush with ring of drain.
- Nailers: Where roof slopes are greater than 1/2 inch per foot, mechanically fasten wood nailers of same thickness as insulation, spaced not more than 20 to 21 ft apart and between insulation boards, depending on board size. Run nailers perpendicular to slope of roof unless otherwise indicated.

END OF SECTION 07 20 00

07 54 23 Thermoplastic-Polyolefin Roofing**07 54 23.03 Preparation:**

Coordinate with COR to insure roofing activities will not interfere with facility operations. Seal and protect openings, Air intakes and doors from dust noise odors of roof work. In areas where there is only suspended ceiling below the roof deck insure that dust and dirt disturbed by roof work do not fall through gaps or openings in the suspended ceiling.

07 54 23.06 Roof Demolition:

Remove no more roofing than can be recovered in the available work time. Remove all old roofing down to the steel deck. Clean deck and insure that it is dry. Insure that all damaged deck is repaired and that all openings not being used are sealed. All deck repairs will meet the uplift requirements of the roof system. Meet all progress cleaning; and protection of the adjacent area; requirements located in sections 01 71 33 and 01 74 00.

07 54 23.09 Roof Membrane Installation

- The Contractor shall install two perimeter sheets as a minimum. Increase the number of perimeter sheets if called for by the manufacturer's instruction. Use the manufacturers approved patterns for layout of the perimeter sheets. Use manufacturer approved fasteners and plates to secure the sheets.
- Lay out field sheets in accordance with manufacturers instructions. Secure with the appropriate fastener and plate combination. Insure adjacent sheets are properly overlapped and prepared for the hot air welding process.
- Use the recommended welder for the seam work being done. Use hand welders for small areas or confined locations only
- After seams are cooled, completely probe the seams with the recommended seam probe tool.
- Quality verification tests to include destructive tests shall be done in accordance with manufacturers instructions.
- All T seams will receive patches in accordance with manufacturers instructions.
- Any membrane that was left exposed prior to being hot air welded shall be cleaned in accordance with the manufacturers instructions
- See 07 65 19 for membrane flashing

07 54 23.12 Overnight Seal/ Temporary water stop

At the end of each workday insure that the roof system is water tight and protected from inclement weather. Extend the membrane beyond the insulation and set into Manufacturers approved seal material.

END OF SECTION 07 54 23

07 62 00 Sheet Metal Flashing and Trim

This Section includes sheet metal flashing and trim in the following categories: Counter-flashing at parapet walls, metal flashings and metal copings.

07 62 03: Submittal Data

Provide product data on sheet metal, coatings. Provided shop drawings of fabrications

- Product Data including manufacturer's material and finish data, installation instructions, and general recommendations for each specified flashing material and fabricated product.
- Shop Drawings of each item specified showing layout, profiles, methods of joining, and anchorage details.
- Samples of sheet metal flashing, trim, and accessory items, in the specified finish. Where finish involves normal color and texture variations, include Sample sets composed of 2 or more units showing the full range of variations expected.
 - 8-inch-square Samples of specified sheet materials to be exposed as finished surfaces.
 - 12-inch-long Samples of factory-fabricated products exposed as finished Work. Provide complete with specified factory finish.

07 62 13 Sheet Metal Fabrication

Sheet Metal Fabrication Standard: Fabricate sheet metal flashing and trim to comply with recommendations of SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of the item indicated.

07 62 13.03

Comply with details shown to fabricate sheet metal flashing and trim that fit substrates and result in waterproof and weather-resistant performance once installed. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

07 62 13.06

Form exposed sheet metal Work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems.

07 62 13.09

Seams Sheet metal: Fabricate nonmoving seams in sheet metal with flat-lock seams. Tin edges to be seamed, form seams, and solder.

07 62 13.12 Expansion Provisions For Aluminum:

Space movement joints at maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions in Work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

07 62 13.15 Sealed Joints:

Form non-expansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.

07 62 13.18

Separate metal from non-compatible metal or corrosive substrates by coating concealed surfaces at locations of contact with asphalt mastic or other permanent separation as recommended by manufacturer. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of sheet metal exposed to public view.

07 62 13.21

Fabricate cleats and attachment devices from same material as sheet metal component being anchored or from compatible, non-corrosive metal recommended by sheet metal manufacturer. The size shall be as recommended by SMACNA manual or sheet metal manufacturer for application but never less than thickness of metal being secured.

07 62 16 Installation Standards of Sheet metal**07 62 16.03 General:**

Unless otherwise indicated, install sheet metal flashing and trim to comply with performance requirements, manufacturer's installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Anchor units of Work securely in place by methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install Work with laps, joints, and seams that will be permanently watertight and weatherproof. Install exposed sheet metal Work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

07 62 16.06 Expansion Provisions:

Provide for thermal expansion of exposed sheet metal Work. Space movement joints at maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions in Work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

07 62 16.09 Joints and Seams

- Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches, except where pre-tinned surface would show in finished Work.
- Do not Solder Coil-coated galvanized steel sheet.
 - Pre-tinning is not required for lead.
 - Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
- Sealed Joints: Form non-expansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards. Fill joint with sealant and form metal to completely conceal sealant.
 - Use joint adhesive for nonmoving joints specified not to be soldered.
 - Fill sealant well of surface-mounted reglets with non-sag urethane sealant specified in Section 07 90 00, "Joint Sealants"
- Seams: Fabricate nonmoving seams in sheet metal with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- Separations: Separate metal from non-compatible metal and from corrosive substrates by coating surfaces at locations of contact with asphalt mastic at concealed location or with other permanent separation as recommended by manufacturer. Bed flanges of Work in a thick coat of roofing cement where required for waterproof performance.

07 62 16.12 Counter-flashings:

Coordinate installation of counter-flashings with installation of assemblies to be protected by counter-flashing. Install counter flashings in reglets or receivers. Secure in a waterproof manner by means of snap-in installation and sealant or by lead wedges and sealant, or by interlocking folded seam, or by blind rivets and sealant. Lap counter flashing joints a minimum of 2 inches and bed with sealant.

07 62 16.15 Roof-Drainage System:

Install drainage items fabricated from sheet metal, with straps, adhesives, and anchors recommended by SMACNA's Manual or the item manufacturer, to drain roof in the most efficient manner. Coordinate roof-drain flashing installation with roof-drainage system installation. Coordinate flashing and sheet metal items for steep-sloped roofs with roofing installation.

07 62 16.18 Equipment Support

Flashing: Coordinate equipment support flashing installation with roofing and equipment installation. Weld or seal flashing to equipment support member.

07 62 16.21 Roof-Penetration Flashing:

Coordinate roof-penetration flashing installation with roofing and installation of items penetrating roof. Install flashing as follows:

- Turn lead flashing down inside vent piping, being careful not to block vent piping with flashing.
- Seal and clamp flashing to pipes penetrating roof, other than lead flashing on vent piping.

07 62 16.24 Cleaning and Protection:

Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes. Provide final protection and maintain conditions that ensure sheet metal flashing and trim Work during construction is without damage or deterioration other than natural weathering at the time of Substantial Completion.

End of Section 07 62 00

07 65 19 Plastic Flashing

Flashing will be used at perimeters, curbs vents, expansion joints, drains and other details as needed. Flashings shall not cover weep holes or any form of thru wall drainage.

- Apply manufacturers approved no/ low odor adhesive to underside of membrane and the surface being adhered to. Following product instructions for application rates
- Use hot air welds to secure TPO membrane to itself
- Insure flashing is completely rolled in and there is no bridging of elevation or directional changes.
- Terminate flashing in accordance with manufacturers standards.

07 72 00 Roof Accessories**07 72 43 Roof Walkway:**

Where indicated on drawings install manufacturer approved membrane walkway over the membrane roof.

- Clean Walkway area according manufacturers instructions allow to completely dry before installing walkway.
- Position walkway cut to length. Leave one to two inch openings to allow for drainage if the walk way impedes drainage. Avoid covering seams.
- Weld perimeter of walkway in accordance with Roof system manufacturers instructions.

END OF SECTION 07 72 00

26 00 00 Electrical**26 05 00 Common Electrical Work Requirements:****26 05 03 Construction Observation of Electrical Work****26 05 03.13 General:**

Review of the work in progress may be made at any time by the C.O.R. Contractor shall provide all tools, equipment, instruments and labor to assist the C.O.R. in performing construction reviews.

26 05 03.16

The Contractor will make a written request for Final construction observation. Prior to requesting a "final" construction observation, the contractor shall provide the following documentation to the C.O.R.:

- Written certification by each system installer that the system has been installed, tested and adjusted.
- Certification shall include the date this work was completed.
- Written certification of the date that all systems were placed in final operating status. (Systems shall be operated with all components functioning properly for not less than one week prior to final observation.)
- All keys, locks and loose items delivered to owner.
- Refer to other paragraphs/sections of Division 26 for specific requirements of documentation.
- The cost for additional construction reviews by the C.O.R., due to the failure by the contractor to provide the above documentation, or failure to complete the work required for this documentation shall be borne by the contractor.

26 05 03.19 Coordination of Electrical Work

Refer to each individual section for general coordination requirements applicable to the entire work. The contract documents are diagrammatic. Physical relationships which must be established within the electrical work, and its interface with other work including utilities and mechanical work is the exclusive responsibility of the contractor.

26 05 06 Existing Conditions:**26 05 06.03**

All information relating to existing conditions is based on existing construction documents and actual conditions may vary; therefore, all existing conditions shall be field verified prior to contract and provisions made to accommodate field variations.

26 05 06.06

Prior to demolition, trace each affected existing circuit, labeling the circuit route, identify the items served, the connected loads, conduit sizes, number, phase, size and rating of conductors, the type and ratings of over current protective devices and other pertinent data.

26 05 06.09

All disruptions of electrical service or circuits shall be coordinated with C.O.R. Disruptions shall be scheduled to occur as per specification Section 01 14 16.20

26 05 06.12

All removed material shall become the property of the contractor unless otherwise noted.

26 05 06 Existing Conditions Continued**26 05 06.15**

All material to be removed shall be removed in its entirety or as noted.

26 05 06.18

Removed conductors shall be removed to the next item(s) in the circuit or feeder.

26 05 06.21

Interconnect new work with existing work to adapt systems.

26 05 06.24

Where a portion of a circuit, feeder or system is interrupted the existing portions shall be re-routed and re-connected together to maintain the integrity of the original circuit, feeder, or system.

26 05 06.27

Where wiring is relocated from one cabinet to another the complete circuit and conduit shall be re-routed to the new location and not pass through the original cabinet, unless noted otherwise.

26 05 06.30

Removal and relocation of the existing work: The drawings indicate the extent of modifications of existing work. The work shall be performed with care in order not to damage the existing equipment and materials. The Contractor shall repair or replace any equipment or materials damaged through his negligence.

26 05 06.33

Wires shall be withdrawn from conduit abandoned or removed entirely as noted, because of equipment removal or relocation. Wire shall be pulled out and disconnected from circuit breaker. Exposed conduit shall be removed and cut off at wall and floor and plugged.

26 05 09 INSTALLATION:**26 05 09.03**

All work shall be executed under the direct supervision of experienced, licensed and trained personnel. Work shall present a neat and mechanically uniform appearance when completed.

26 05 09.06

Arrange electrical work in a neat, well organized manner with conduit and similar services running parallel with primary lines of the building construction, and with a minimum of 7'-0" overhead clearance where possible.

26 05 09.09

Prior to rough-in of any materials coordinate with other trades on required physical clearances for installation and routing of electrical, HVAC, plumbing and structural systems. Locate operating and control equipment properly to provide easy access, and arrange entire electrical work with adequate access for operation and maintenance.

26 05 09.12

Advise other trades of opening required in their work for the subsequent move-in of large units of electrical work (equipment).

26 05 09.15

Coordinate routing of major conduits with other trades prior to roughing in of any work.

26 05 19 Conductors:**26 05 19.03 Conductors Standards**

- Sizes: Minimum #12 for electrical power and branch circuit conductors
- When copper conductors #10 and smaller. They shall be labeled per UL 83, type THHN/THWN, solid copper, 600 volt insulation, uniform color coded jacket per 26 05 53 by manufacturer with jacket data. Submit material specifications data for these products.

26 05 19.06 Conductor Connections:

Conductors #10 and smaller, utilize either crimp type or twist-on type.

26 05 19.09 Conductor Terminals:

Utilize copper conductor type terminals on all copper conductors.

26 05 19.11 Electrical Conductor Tape:

Apply to any un-insulated portion of a conductor, connection, splice, terminal or termination to maintain the integrity of the insulation system.

26 05 19.16 Conductor Installation:

- Coordinate conductor installation work with the completion of the raceway equipment installation.
- Blow out and swab all raceways clear of debris, water and other foreign matter prior to installation of conductors.
- Utilize pulling means that will not damage the raceway.
- Observe the manufacturer's recommendation for the installation of conductors.
- Pull all conductors of a run together, simultaneously.
- Splices shall occur only in junction boxes. Splices in panel boards, pull boxes and fittings are prohibited, unless indicated otherwise.

26 05 19.19 Phasing:

The phasing shall be established at the building service and uniformly maintained throughout the entire electrical system. Each conductor throughout the system shall be identifiable by the color-coding as to its phase and applied voltage.

26 05 26 Grounding & Bonding**26 05 26.03 Ground Conductors:**

Refer to Conductors Section, sized per NFPA 70-250, unless indicated otherwise.

26 05 26.13 Installation Standards

Clean and prepare surfaces for ground connections to ensure electrical continuity.

26 05 26.16 Bonding:

Bond together all non-current carrying metallic parts to provide continuous grounded path for all devices, equipment, and enclosures. Provide green grounding conductor in all conduits.

26 05 29 Hangers and Supports:**26 05 29.03 Framing Channel and Hardware:**

Structural steel "U" shaped 1-5/8" framing channel complying with NEMA Standard MIL - 1975 and ASTM A569 and associated hardware with galvanized finish for indoor protected NEMA 1 type applications or PVC coated for all exterior application.

26 05 29.06 Concrete Attachment:

Drill and use expansion anchors with design support of 300% or greater of load.

SECTION 26 05 33 –Raceways and Boxes**26 05 33.03 Submittal Requirements:**

Submit material specifications data for products specified in this section

26 05 33.06 Raceway Material Description/ Application:

Galvanized rigid steel conduit/ Building interior use

Polyvinyl chloride coated Galvanized rigid steel conduit/ Building exterior use

26 05 33.06 Exterior Junction Boxes:

Labeled per UL #514, NEMA OS-1, NFPA 70-370.

Cast metal boxes, gasketed of the following types: FSCT and LB with minimum sizes as shown on the drawings.

26 05 33.09 Junction Boxes and Pull Boxes:

Labeled per UL 514 NEMA OS-1, NFPA 70 –370. For boxes in NEMA 1 locations use galvanized sheet steel enclosure with welded Seams, neoprene gaskets, hinged cover secured with screws. Provide boxes for all devices, fixtures, equipment, junctions, and splice and pull boxes, unless box is integral part of a device fixture or equipment. Support each box per NFPA 70.

26 05 33.12 Installation Standards

Coordinate with other trades as to materials and methods of installing various box types in the actual construction.

- Location: Splice box locations indicated on the plans are approximate. Coordinate and determine the exact location at the building. The C.O.R. reserves the right to shift the exact location of any splice box 10 feet before it is permanently installed.
- Mounting: Install boxes plumb when vertical, level when horizontal and flush with adjacent surface when recessed.
- Accessibility: Locate boxes and conduit bodies so that covers are accessible and removable.
- Configuration: Match box configuration to applications.
- Size: Utilize box size (capacity) based on NEC.
- Device Support: For devices, utilize boxes designed to support the device independently of cover plate and so install.
- Knockout and threaded openings: Cover unused conduit openings with plastic covers for sheet steel boxes and threaded plugs for cast boxes.
- Clean: Prior to pulling conductors or installing devices, clean boxes of dirt, debris and water.
- Cover: Cover all boxes and secure with screws or bolts.
- Pull Boxes: Install pull boxes to limit pulling distance and/or pulling bends.

26 05 53 Electrical Identification**26 05 53.10 Color Coding:**

120/208 V 277/480 V wye

Phase A	Black	Yellow
Phase B	Red	Orange
Phase C	Blue	Brown
Neutral White		Gray
Ground Green		Green

26 05 53.20 Labeling Devices

The last junction box before a device will be labeled with the panel board and circuit number

END OF SECTION 26 05 00

26 06 00 Electrical Schedule**26 06 20.29 Conductor Connectors and Terminators Schedule:**

Labeled per UL 486A, 486B, and 486D.

Insulated Crimp (sleeve) type: Cylindrical shaped type conductor sleeve for crimping copper conductors with integral nylon or insulating plastic cover.

Uninsulated Crimp (sleeve) type: Cylindrical shaped type conductor sleeve for crimping copper conductors. Provide a separate molded rubber insulating cover, or a heat shrink end cap.

Twist-On (spring) type: Inner spiral spring for holding and making electrical contact between copper conductors with outer long skirted insulated cover of nylon or plastic. Spring type wire connectors shall comply with Federal Specification W-S-160.

Compression type: Utilize color coded compression type, tin-plated metal connectors filled with oxide inhibitor compound for joining copper-copper, conductors with power actuated crimping tool and insulated with nylon or plastic cover or with electrical tape. The crimping tool/die shall leave a positive indication of die size and type on the lug.

Acceptable manufacturers:

- 3M - Irvington
- 3M - Scotch
- Buchanan
- Ideal
- King
- Plymouth
- Thomas & Betts

26 06 20.54 Miscellaneous Electrical Accessories Schedule:

Electrical Tape:

- 7-mil thick vinyl plastic electric tape.
- 0 degrees F to 220 degrees F use rating.
- Ultraviolet, abrasion, moisture, alkali, acid and corrosion resistant
- 600 volt rated, UL labeled.
- ASTM D-3005 Type I, UL510, HHI-595C, and CSA C22.2
- Acceptable manufacturers:
 - 3M - Irvington
 - 3M - Scotch
 - Okonite
 - Plymouth

END OF SECTION 26 06 00

SECTION 26 41 13 – Lightning Protection System**SECTION 26 41 13.03 - Lightning Protection System**

The contractor shall include plans and elevations at not less than 1/16" to 1'-0" scale with details at not less than 3" to 1'-0" scale. Indicate the complete system cable routing (both horizontal and vertical), all devices, connections, bonding, penetrations, grounding and ground resistances. Indicate required anchorage and accessory items, field dimensions, finishes, method of connection and routing.

26 41 13.06 Certificates:

The contractor shall submit Installer Certification for records and submit UL listed Master Label for records.

26 41 13.09 Lightning Protection products

Provide system material to install an existing lightning protection system. All material shall be labeled per UL #96 and #96A and conform to NFPA #780. Replace existing air terminals existing main conductors with new materials as noted on the drawings.

- Main Roof Conductor: Aluminum, 37 strands of 13 gauge, rope lay 190#/1000 ft.). Utilize aluminum conductor, or as noted on plans.
- Air Terminals and Bases: Solid round aluminum rod, 5/8" diameter with blunt tip and 5/8" external threaded adapter base or as noted on the plans.
- New terminal bases shall be of cast aluminum with bolted pressure cable connections and utilize stainless steel hardware. The base-to-roof attachment shall conform to the roof construction and as noted on the plans.
- Bonding Plates: Cast aluminum bonding plate with bolted pressure cable connector and stainless steel hardware. The configuration shall match the characteristics, cable arrangement and attachment required for bonding. There shall be a minimum of 8 square inches of contact area.
- Cable Fasteners: Electrically compatible with conductor material and conforming to the characteristics of the base to which it attaches.
- Cable Splicers and Connectors: Cast aluminum; select to be electrically compatible with conductor, with bolt pressure connections and stainless steel hardware for all exposed and accessible applications.

In order to define requirements for material specifications, and provide for total system responsibility all products shall be compatible with existing as furnished by one of the following manufacturers:

- Heary Brothers Lightning Protection, Inc.
- Independent Protection Company, Inc.
- Thompson Lightning Protection, Inc.
- Robbins Lightning, Inc.

26 41 13.13 Installation

The system shall be installed per UL, NFPA and manufacturer's drawings, data and instructions. Provide Air Terminals as shown on the Drawings.

Conductors: At all connections aluminum to existing copper, bi-metal Connectors shall be used.

Conductors shall be coursed to interconnect all air terminals so as to provide a 2-way path to ground.

The angle of any turn shall not exceed 90 degrees and shall not exceed 90 degrees and shall provide a horizontal or downward path. No bend shall have a radius of less than 8".

Fasteners: Conductors shall be secured at a maximum of 3' o.c. with appropriate fasteners for the cable size and material to which it is fastened.

Bonding: Bond lightning protection system to all metallic objects of conductance within 6' of conductor or at above roof level with full size conductor and minimum of 3 square inch connector. Bond all bodies of inductance at or below roof level within 6' of a lightning protection conductor or within 6' of another grounded body of metal.

END OF SECTION 26 41 00

SECTION 26 56 36 Lighting Fixtures

Submit with data sheet with complete physical, electrical and lighting characteristics, lamp type and lamp data. Provide compact floodlight---Security Lighting---Wide horizontal light beam pattern, die cast aluminum housing, wet location. Door latches with gasket seal, High Pressure Sodium, multiple voltage ballast, UL label, and dark bronze exterior waterproof grade fixture.

Lamps---150 watts, HPS

Voltage---120 volts

Installation---Thread knuckle to cast outlet body

Manufacturer---Hubbell Lighting Façade F15051

End of Section 26 56 00

End of Section 26 00 00